

1 of 4

Complete if Known	
Application Number	10/769,498
Filing Date	January 30, 2004
First Named Inventor	Bailey
Art Unit	2811
Examiner Name	Unassigned
Attorney Docket Number	LAM2P447

**U.S. Patent Documents**

Examiner Initials	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
ZKS	A1	US 2004/242012	Dec 2, 2004	Ikeda	
	B1	6,767,829	Jul 27, 2004	Akahori	
	C1	6,600,229	Jul 29, 2003	Mukherjee et al.	
	D1	6,482,755	Nov 19, 2002	Ngo et al.	
	E1	6,440,840	Aug 27, 2002	Chen	
	F1	6,417,093	Jul 9, 2002	Xie et al.	
	G1	6,383,935	May 7, 2002	Lin et al.	
	H1	6,350,364	Feb 26, 2002	Jang	
	I1	6,350,664	Feb 26, 2002	Haji et al.	

**Foreign Patent Documents**

Examiner Initial	Cite No. <sup>1</sup>	Foreign Patent Document No.	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, where Relevant Passages or Relevant Figures Appear	T <sup>6</sup>
		Country Code <sup>3</sup> -Number- <sup>4</sup> Kind Code <sup>5</sup> (if known)				
ZKS	J1	EP 1 320 128 A1	06/18/03	AMI Semiconductor		<input type="checkbox"/>
	K1	WO 03/026004	03/27/03	Tokyo Electron Limited		<input type="checkbox"/>
	L	EP 1 081 751 A2	03/07/01	Applied Materials		<input type="checkbox"/>
	M1	EP 1 041 614 A1	10/04/00	LSI Logic Corporation		<input type="checkbox"/>
	N1	JP 11 067766	03/09/99	Sony Corp.		<input type="checkbox"/>

**Non Patent Literature Documents**

Examiner Initial	Cite No.	Include name of author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published
ZKS	O1	TEGAL CORPORATION, "Enabling a Wireless World", page 1, <a href="http://www.tegal.com/">http://www.tegal.com/</a>
	P1	TEGAL CORPORATION, "Corporate Information", pages 1-7, <a href="http://www.tegal.com/corp/corpinfo.html">http://www.tegal.com/corp/corpinfo.html</a>
	Q1	TEGAL CORPORATION, "Products and Services", page 1, <a href="http://www.tegal.com/prod_svcs/products_serv.html">http://www.tegal.com/prod_svcs/products_serv.html</a>

Examiner Signature		Date Considered	9/30/05
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Examiner: Initial if reference is considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

<sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language translation is attached.

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**U.S. Patent Documents**

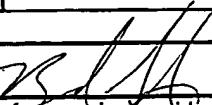
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		Number-Kind Code <sup>2</sup> (if known)			
ZKCS	A2	6,323,121	Nov 27, 2001	Liu et al.	
	B2	US 2001/018271	Aug 30, 2001	Yanagisawa	
	C2	US 2001/015175	Aug 23, 2001	Masuda et al.	
	D2	US 2001/003060	Jun 7, 2001	Yokohama et al.	
	E2	6,234,870	May 22, 2001	Uzoh et al.	
	F2	6,221,775	Apr 24, 2001	Ference et al.	
	G2	6,096,230	Aug 1, 2000	Scatz et al.	
Y	H2	6,051,496	Apr 18, 2000	Jang	

**Foreign Patent Documents**

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		Country Code <sup>3</sup> -Number- <sup>4</sup> Kind Code <sup>5</sup> (if known)				
ZKCS	I2	WO 02/37541 A2	May 10, 2002	Applied Materials Inc.		<input type="checkbox"/>
ZKCS	J2	WO 00/59005	Oct 5, 2000	Tokyo Electron Limited		<input type="checkbox"/>
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	L2					<input type="checkbox"/>
	M2					<input type="checkbox"/>

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Examiner Initial	Cite No.	Include name of author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published
ZKCS	N2	TEGAL CORPORATION, "Products and Services, 6500 Hre Series", pages 1-3, <a href="http://www.tegal.com/prod_svcs/6500_prod.html">http://www.tegal.com/prod_svcs/6500_prod.html</a>
	O2	TEGAL CORPORATION, "Products and Services, 900 Series", pages 1-4, <a href="http://www.tegal.com/prod_svcs/900_prod.html">http://www.tegal.com/prod_svcs/900_prod.html</a>
Y	P2	TEGAL CORPORATION, "Products and Services, Tegal i90X-The Next Generation in Plasma Etch Technology", pages 1-4, <a href="http://www.tegal.com/prod_svcs/i90x_data_sheet.html">http://www.tegal.com/prod_svcs/i90x_data_sheet.html</a>
	Q2	

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		Number-Kind Code <sup>2</sup> (if known)			
	A3				
	B3				
	C3				
	D3				
	E3				
	F3				
	G3				
	H3				

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		Country Code <sup>3</sup> -Number- <sup>4</sup> Kind Code <sup>5</sup> (if known)				
ZKCS	I3	WO 99/46812	Sep 16, 1999	Applied Materials Inc.		<input type="checkbox"/>
	J3					<input type="checkbox"/>
	K3					<input type="checkbox"/>
	L3					<input type="checkbox"/>
	M3					<input type="checkbox"/>

**Non Patent Literature Documents**

Examiner Initial	Cite No.	Include name of author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published
ZKCS	N3	NAGRAJ S. KULKARNI, ROBERT T. DeHOFF, "Application of Volatility Diagrams for Low Temperature, Dry Etching, and Planarization of Copper", Journal of The Electromechanical Society, 2002, pp G620 – G632
	O3	KAZUHIDE OHNO, MASAAKI SATO, YOSHINOBU ARITA, "Reactive Ion Etching of Copper Films in SiCl <sub>4</sub> and N <sub>2</sub> Mixture", Japanese Journal of Applied Physics, June 1989, No. 6, Part 2, pp 1070 - 1072
	P3	
	Q3	

Examiner Signature	<i>ZKCS</i>	Date Considered	9/30/04
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Sheet	4	of	4	Attorney Docket Number	LAM2P447

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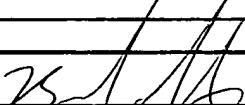
Examiner Initials	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
A4					
B4					
C4					
D4					
E4					
F4					
G4					
H4					

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		Country Code <sup>3</sup> -Number- <sup>4</sup> Kind Code <sup>5</sup> (if known)				
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J4						<input type="checkbox"/>
K4						<input type="checkbox"/>
L4						<input type="checkbox"/>
M4						<input checked="" type="checkbox"/>

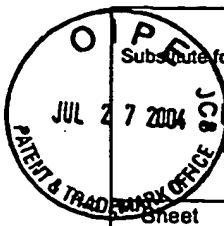
**Non Patent Literature Documents**

Examiner Initial	Cite No.	Include name of author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published				
ZK/S	N4	K. MOSIG, T. JACOBS, P. KOFRON, M. DANIELS, K. BRENNAN, A. GONZALES, R. AUGUR, J. WETZEL, R. HAVEMANN, A. SHIOTA, "Single and Dual Damascene Integration of a Spin-on Porous Ultra low-k Material", IEEE, 2001 pp. 292 - 294				
ZK/S	O4	DAVID T. PRICE, RONALD J. GUTMANN, SHYAM P. MURARKA, "Damascene copper interconnects with polymer ILDs", 1997 Thin Solid Films, pp. 523 - 528				
	P4					
	Q4					

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Examiner: Initial if reference is considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

<sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language translation is attached.



Substitute for form 1449/PTO

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
*(Use as many sheets as necessary)*

Sheet 1 of 1

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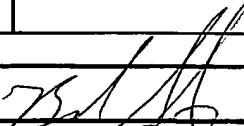
Examiner Initials	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
BKCS	A	4,838,289	06/1989	Kottman et al.	
	B	5,271,774	12/1993	Leenaars et al.	
	C	5,705,223	01/1998	Bunkofske	
	D	5,945,351	08/1999	Mathuni	
	E	5,997,653	12/1999	Yamasaka	
	F	6,398,975	06/2002	Mertens et al.	
✓	G	6,491,764	12/2002	Mertens et al.	
	H				

**Foreign Patent Documents**

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		Country Code <sup>3</sup> -Number- <sup>4</sup> Kind Code <sup>5</sup> (if known)				
BKCS	I	JP02280330	11/1990	Mitsubishi Electric Corp.		<input checked="" type="checkbox"/>
BKCS	J	JP02309638	12/1990	Fujitsu LTD		<input checked="" type="checkbox"/>
BKCS	K	JP11350169	12/1999	Chemtronics Co.		<input checked="" type="checkbox"/>
	L					<input type="checkbox"/>
	M					<input type="checkbox"/>

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BKCS	N	DR. VICTOR KU, 'Low-k Integration Challenges in the Year 2000", Industry Information - What's Up From SEMI - Industry Report, <a href="http://dom.semi.org/web/swemi.nsf/webdocs/9221127CB15550BB88256A4900738B6F">http://dom.semi.org/web/swemi.nsf/webdocs/9221127CB15550BB88256A4900738B6F</a>
	O	INTEL, 'Intel 1.2 GHX All copper Pentium 3 Microprocessor Structural Analysis", Chipworks Reports, <a href="http://www.chipworks.com/reports/flyers/Intel_P3_013.htm">http://www.chipworks.com/reports/flyers/Intel_P3_013.htm</a>
✓	P	SHIM NAMWOO, "Introduction To InterMetallic Dielectrics & Cu Integration for beginners in our lab."
	Q	

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<sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language translation is attached.

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Sheet

1

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7

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		Number-Kind Code <sup>2</sup> (if known)			
ZK/S	A-1	US 2003/0224596	Dec 4, 2003	Marxsen et al.	
	B-1	6,653,224	Nov 25, 2003	Gotkis et al.	
	C-1	US 2003/0213558	Nov 20, 2003	Basol et al.	
	D-1	US 2003/0211746	Nov 13, 2003	Chen et al.	
	E-1	US 2003/0203321	Oct 30, 2003	Ma et al.	
	F-1	US 2003/0199112	Oct 23, 2003	Shanmugasundram et al.	
	G-1	US 2003/0196989	Oct 23, 2003	Zhou et al.	
	H-1	6,630,413	Oct 7, 2003	Todd	
	I-1	US 2003/0186546	Oct 2, 2003	Wollstein et al.	
	J-1	US 2003/0184732	Oct 2, 2003	Katz et al.	
	K-1	6,620,726	Sep 16, 2003	Preusse et al.	
↓	L-1	US 2003/0166345	Sep 4, 2003	Chang	

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		Country Code <sup>3</sup> -Number <sup>4</sup> -Kind Code <sup>5</sup> (if known)				
ZK/S	M-1	WO 03/058703	Jul 17, 2003	Gotkis et al.		<input type="checkbox"/>
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	O-1	WO 00/03426	Jan 20, 2000	Wang		<input type="checkbox"/>
↓	P-1	JP 07235543	Sep 5, 1995	Fukuyama		<input type="checkbox"/>

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ZK/S	Q-1	Y. OSHITA, N. HOWI, "Lower temperature plasma etching of Cu using IR light irradiation", Thin Solid Films, 1995
↓	R-1	LYNN R. ALLEN, JOHN M. GRANT, "Tungsten plug etchback and substrate damage measured by atomic force microscopy", J. Vac. Sci Technol. May/Jun 1995 pp 918-922
↓	S-1	WILLIAM F. MARX, YUNJU RA, RICHARD YANG, CHING-HWA CHEN, "Plasma and processing effects of electrode spacing for tungsten etchback using a bipolar electrostatic wafer clamp", J. Vac. Sci Technol. Nov/Dec 1994 pp 3087-3090

Examiner Signature

*ZK/S*

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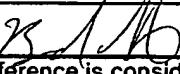
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ZKS	A-2	US 2003/0164354	Sep 4, 2003	Hsieh et al.	
	B-2	6,617,232	Sep 9, 2003	Kim et al.	
	C-2	US 2003/0119305	Jun 26, 2003	Huang et al.	
	D-2	6,582,974	Jun 24, 2003	Lui et al.	
	E-2	6,576,550	Jun 10, 2003	Brase et al.	
	F-2	6,579,800	Jun 17, 2003	Basol et al.	
	G-2	6,573,187	Jun 3, 2003	Chen et al.	
	H-2	US 2003/0092260	May 15, 2003	Lui et al.	
	I-2	US 2003/0087586	May 8, 2003	Kaushal et al.	
	J-2	6,559,049	May 6, 2003	Chen et al.	
	K-2	US 2003/0082996	May 1, 2003	Fortin et al	
↓	L-2	US 2003/0073319	Apr 17, 2003	Basol et al.	

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	N-2					<input type="checkbox"/>
	O-2					<input type="checkbox"/>
	P-2					<input type="checkbox"/>

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ZKS	Q-2	J. FARKAS, K.-M. CHI, M.J. HAMPDEN-SMITH, T.T. KODAS, "Low-temperature copper etching via reactions with Cl <sub>2</sub> and Pet <sub>3</sub> under ultrahigh vacuum conditions", J. Appl. Phys., February 1993, pp 1455-1460
	R-2	SEONGJU PARK, T.N. RHODIN, L.C. RATHBUN, "Halide formation and etching of Cu thin films with Cl <sub>2</sub> and Br <sub>2</sub> ", J. Vac. Sci Technol., Mar/Apr 1986, pp 168-172
	S-2	LYNN R. ALLEN, "Tungsten Plug Etchback In A TCP Etcher", Sharp Microelectronics Technology, Inc., pp 255-263
↓	T-2	N. HOSOI, Y. OHSHITA, "Plasma Etching Of Copper Films Using IR Light Irradiation", Mat. Res. Soc. Symp. Proc. Vol. 337, 1994, pp 201-205

Examiner Signature		Date Considered	9/30/05
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				Application Number	10/769,498
				Filing Date	January 30, 2004
				First Named Inventor	Bailey
				Art Unit	2811
				Examiner Name	Unassigned
Sheet	3	of	7	Attorney Docket Number	LAM2P447

**U.S. Patent Documents**

Examiner Initials	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
<i>JKL</i>	A-3	US 2003/0057179	Mar 27, 2003	Luo et al.	
	B-3	US 2003/004375	Mar 13, 2003	Nguyen et al.	
	C-3	US 2003/0044725	Mar 6, 2003	Hsue et al.	
	D-3	US 2003/0045100	Mar 6, 2003	Saka et al.	
	E-3	6,527,911	Mar 4, 2003	Yen et al.	
	F-3	US 2003/0032278	Feb 13, 2003	Chen et al.	
	G-3	US 2003/0029567	Feb 13, 2003	Dhindsa et al.	
	H-3	6,517,413	Feb 11, 2003	Hu et al.	
	I-3	US 2003/0013316	Jan 16, 2003	Kim et al.	
	J-3	6,500,357	Dec 31, 2002	Luo et al.	
	K-3	US 2002/0192966	Dec 19, 2002	Shanmugasundram et al.	
	L-3	US 2002/0192957	Dec 19, 2002	Chien et al.	

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N-3						<input type="checkbox"/>
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	R-3	
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		Number-Kind Code <sup>2 (if known)</sup>			
ZS/LS	A-4	US 2002/0187627	Dec 12, 2002	Yuang	
	B-4	US 2002/0182853	Dec 5, 2002	Chen et al.	
	C-4	US 2002/0175071	Nov 28, 2002	Hymes	
	D-4	6,486,059	Nov 26, 2002	Lee et al.	
	E-4	6,482,331	Nov 19, 2002	Lu et al.	
	F-4	6,479,391	Nov 12, 2002	Morrow et al.	
	G-4	6,475,298	Nov. 5, 2002	O'Donnell et al.	
	H-4	US 2002/0153350	Oct 24, 2002	Lu et al.	
	I-4	US 2002/0124867	Sep 12, 2002	Kim et al.	
	J-4	US 2002/0121500	Sep 5, 2002	Annapragada et al.	
	K-4	6,423,200	Jul 23, 2002	Hymes	
	L-4	US 2002/0155695	Oct 24, 2002	Lee et al.	

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		Country Code <sup>3</sup> -Number <sup>4</sup> Kind Code <sup>5 (if known)</sup>				
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	R-4	
	S-4	
	T-4	

Examiner Signature	<i>ZS/LS</i>	Date Considered	9/30/04
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				Art Unit	2811
				Examiner Name	Unassigned
Sheet	5	of	7	Attorney Docket Number	LAM2P447

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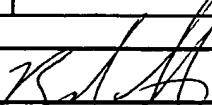
Examiner Initials	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
BK5	A-5	6,448,176	Sep 10, 2002	Grill et al.	
	B-5	US 2002/0081854	Jun 27, 2002	Morrow et al.	
	C-5	US 6,408,786	Jun 25, 2002	Kennedy et al.	
	D-5	US 2002/0045354	Apr 18, 2002	Ye et al.	
	E-5	6,368,517	Apr 9, 2002	Hwang et al.	
	F-5	6,365,327	Apr 2, 2002	Chittipeddi et al.	
	G-5	6,352,081	Mar 5, 2002	Lu et al.	
	H-5	US 2002/0016084	Feb 7, 2002	Todd	
	I-5	US 2001/0054381	Dec 27, 2001	Umotoy et al.	
	J-5	6,331,380	Dec 18, 2001	Ye et al.	
	K-5	6,313,025	Nov 6, 2001	Chittipeddi et al.	
	L-5	6,227,140	May 8, 2001	Kennedy et al.	

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				Art Unit	2811
Examiner Name	Unassigned				
Sheet	6	of	7	Attorney Docket Number	LAM2P447

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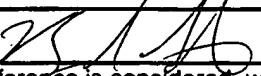
Examiner Initials	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
ZSKS	A-6	6,184,128	Feb 6, 2001	Wang et al.	
	B-6	6,174,813	Jan 16, 2001	Wang	
	C-6	6,153,530	Nov 28, 2000	Ye et al.	
	D-6	6,153,116	Nov 28, 2000	Yang et al.	
	E-6	6,147,005	Nov 14, 2000	Tu et al.	
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	G-6	6,133,144	Oct 17, 2000	Tsai et al.	
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	J-6	6,008,130	Dec 28, 1999	Henderson et al.	
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	L-6	5,968,847	Oct 19, 1999	Ye et al.	

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Sheet	7	of	7	Attorney Docket Number	LAM2P447

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<i>ZKCS</i>	A-7	5,770,100	Jun 23, 1998	Fukuyama et al.	
	B-7	5,744,402	Apr 28, 1998	Fukazawa et al.	
	C-7	5,556,714	Sep 17, 1996	Fukuyama et al.	
	D-7	5,534,751	Jul 9, 1996	Lenz et al.	
	E-7	5,387,315	Feb 7, 1995	Sandhu	
	F-7	5,380,397	Jan 10, 1995	Fukuyama et al.	
	G-7	5,302,241	Apr 12, 1994	Cathey, Jr.	
	H-7	5,256,565	Oct 26, 1993	Bernhardt et al.	
	I-7	5,200,031	Apr 6, 1993	Latchford et al.	
	J-7	5,098,516	Mar 24, 1992	Norman et al.	
	K-7	5,009,738	Apr 23, 1991	Gruenwald et al.	
<i>✓</i>	L-7	4,985,113	Jan 15, 1991	Fujimoto et al.	

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